GNWT Report on Drinking Water

Northwest Territories

May 2010

The Northwest Territories (NWT) has many clean water sources. Water from these lakes, rivers, and wells, is treated at 30 community water treatment plants (WTPs) to ensure it is safe to drink. The treated water is distributed to homes by water trucks or piped systems for people to use.

The management of drinking water is the shared responsibility of all levels of government. Community governments are responsible for operating and maintaining WTPs. The Government of the Northwest Territories (GNWT) is responsible for the regulation of water supply systems, providing certification and training and support to WTP Operators. The GNWT also inspects WTPs and reviews water quality data from communities to ensure the treated water is safe to drink.

The Guidelines for Canadian Drinking Water Quality (GCDWQ) are developed by a Federal-Provincial-Territorial Committee on Drinking Water and are published by Health Canada. The GNWT Water Supply System Regulations adopt the GCDWQ. Understanding and meeting the guidelines is an important component of a multi barrier approach to safe drinking water.

The GNWT's responsibilities are shared among four departments – Health and Social Services (HSS), Municipal and Community Affairs (MACA), Public Works and Services (PWS) and Environment and Natural Resources (ENR). Work is coordinated through an Interdepartmental Water and Wastewater Management Committee made up of four Deputy Ministers, one from each department.

The Committee's work is guided by the GNWT's Managing Drinking Water in the NWT: A Preventative Framework and Strategy and associated action plans developed annually. The strategy's goals include; keeping NWT water clean, making water safe to drink and ensuring drinking water is safe.

This report provides an overview of the initiatives that are new and ongoing in the area of drinking water quality. Information on your community drinking water system can be found in the table on pages 8 and 9 of this report. Detailed drinking water quality information for your community can be found on the Internet at: http://www.maca.gov.nt.ca/operations/water/WaterQ_Main_MenuSQL.asp.

If you do not have access to the internet please contact your Regional Environmental Health Officer (EHO) if you have questions about the water quality in your community. EHO contact information is provided on the back page of this report.

Water Supply in Ulukhaktok RCAF Lake

Great Bear River between Dél̨ı̨ne and Tulita

Keeping Drinking Water Clean

Mapping and Protecting Community Public Water Supply Sources

People who live and work in communities are in the best position to identify what water resources values, including public water supply sources, are important to them in and around their communities. NWT water resources include rivers, lakes, streams, deltas, tributairies of deltas, groundwater and wetlands, whether in liquid or frozen state. Then communities can plan to ensure these values are protected. ENR works with multiple agencies, including community governments, to help identify public water supply source watersheds and the values that may be at risk within those watersheds when activities take place on the land. This assists agencies to plan, regulate or use waters, or respond to emergency situations that may affect those waters.

A watershed is an area that drains all precipitation (rain or melted snow that runs off the land) or flows into the ground and then into a particular connected set of rivers and lakes. If residents and officials know which lakes and rivers are in the watershed of their water supply intake, they can make informed decisions about which parts of the watershed may be affected by activities on the land or in the water bodies. Then they can decide what special protective measures may be necessary.

In each community, each water treatment plant is designed to make the “source water” or “raw water” clean enough for human consumption. Water treatment plants are designed to run sufficient amounts of water through them to meet community needs, including domestic, commercial, or fire protection use. In order to ensure the plant will work properly and be able to draw enough water, it is important that the raw water remains abundant and in the same or better condition for which the plant was designed. To help identify risks to community public water supply sources, people need to know geographic information within watersheds about things like land use activities, soils, transportation routes, water withdrawals and waste disposal, including sewage discharges. Then people can assess risks posed from community or industrial activities, weather events, or spills. Climate change also influences community water supplies through droughts, storms and groundwater melt. Currently community watershed maps, with or without a base satellite image, are electronically available for each NWT community at: http://maps.gnwtgeomatics/portal/watershedmaps.jsp

In the coming years, ENR and others will work with communities to develop standard methods to examine, manage and communicate risks to public water supply sources. Community-based monitoring is promoted in these processes.

Northern Voices: Northern Waters an NWT Water Stewardship Strategy sets a guiding vision, goals and approaches for water users, planners and regulators.

For more information on the noted activities, please contact ENR’s Land and Water Division at (867) 920-3256.

A copy of the current draft of Northern Voices: Northern Waters can be viewed on-line at: http://www.enr.gov.nt.ca/_live/pages/wpPages/water.aspx)

Raw Water Resevoir in Jean Marie River

Info on Raw Water

1. Raw water is usually from wells or surface sources, which has had no previous treatment and is entering a water processing system or device.
2. Raw water should not be considered safe for drinking or washing without further treatment.
3. Raw water reservoirs are used in the NWT either to store water when the quality is best or when there is no year round access to a water source.

Water License Funding

Water licences help protect community drinking water sources. They define how much raw water the community can take from the source and how to dispose of waste so it doesn't harm water bodies.

Water licences are a regulatory requirement and are issued by one of five water boards in the NWT: the NWT Water Board, the Sahtu, Gwich'in, Wek'èezhìi and Mackenzie Valley Land and Water Boards. Indian and Northern Affairs Canada (INAC) Resource Management Officers inspect the water, wastewater and solid waste facilities to make sure water licence requirements are followed. Some requirements include annually reporting water use and sewage disposal volumes, sampling sewage effluent and landfill leachate, reporting sampling results and spills and developing operations and maintenance manuals.

Łutselk'e Truckfill Station

Communities are required to have a water licence under the NWT Waters Act. The Hay River Reserve is exempt because they use the water and waste facilities in Hay River and Kakisa is exempt because they are too small to need a water licence. The table on pages 8 and 9 shows which communities have existing water licences, which communities don't have water licences and those pending the approval of the Land and Water Boards. Communities that don't need a water licence are listed as N/A (not applicable).

Since 2006 MACA has been providing funding to community governments for water licence application development. Priority is given to communities that do not have an existing water licence, but has been provided to communities that were submitting water licence renewal applications. Eight (8) communities received funding for water licence applications/ renewals since 2006.

It is anticipated that Łutselk'e, Wrigley, Jean Marie River, and Trout Lake will be submitting water licence applications as a part of an upcoming water treatment plant upgrade project that the GNWT is managing.

Water Supply System Regulations

Effective September 14, 2009, the Northwest Territories enacted a new Public Health Act and accompanying new regulations, including the Water Supply System Regulations. The previous Public Water Supply Regulations were repealed. The Act and regulations are enforced by EHOs with the Department of Health and Social Services. These new regulations are applicable to all systems in the NWT and they bring some important changes. The most notable changes include:

1. Approvals from the Chief Public Health Officer (CPHO) for the use of a water source, operations, and design is required.
2. Operator Certification is now mandatory. The CPHO has the authority to issue special approvals for a community to operate their water treatment plant without a certified operator if certain criteria are met.
3. The regulations adopt the Guidelines for Canadian Drinking Water Quality (GCDWQ), making them part of the regulations in the NWT.

The GCDWQ are published by Health Canada on behalf of the Federal-Provincial-Territorial Committee on Drinking Water. The guidelines are based on current, published scientific research related to health effects, aesthetic effects, and operational considerations.

For further details on changes to the regulation and how they impact your community please contact your Regional EHO. Contact information is available on the back page of this report.

Turbidity

Turbidity describes the cloudiness that results from small particles in the water. The more turbid the water, the greater the possible health risk because the particles can hide bacteria, viruses or protozoa and make disinfectants less effective.

New Water Treamtent Plant in Behchokǫ̀ (Edzo) (Left)
UV Reactor in the Dél̨ı̨ne Water Treatment Plant (Right)

Drinking Water Quality Sampling Requirements

Water quality can't be determined by looking at it; therefore, sampling and testing is required to determine its quality and the necessary treatment required to make it safe for consumption. In the NWT, the CPHO is provided authority under the Water Supply System Regulations to direct operators and owners of public drinking water systems to conduct and perform sampling and testing. The NWT drinking water sampling and testing requirements include both raw and treated water sampling and testing. HSS has summarized these requirements and has them listed on their website at:

http://www.hlthss.gov.nt.ca/pdf/brochures_and_fact_sheets/environmental_health/2007/english/nwt_drinking_water_sampling_and_testing_requirements.pdf.

The summary table can also be viewed on page 15 of this report.

Testing Raw Water Quality

It is important to perform regular testing on the raw water to monitor if changes have occurred and if any problems exist with your water quality. HSS requires daily testing for turbidity and as required other site specifc parameters, monthly bacteriological testing, and annual chemical testing of the raw water. Community governments are responsible for daily raw water testing and monthly bacteriological testing. EHOs who enforce the Public Health Act and Water Supply System Regulations collect the annual chemical samples to ensure consistency in sample collection. Raw and treated water quality data is compared to determine how well the water treatment process is working.

The GNWT continually works with communities to ensure an understanding of the water quality testing requirements and procedures.

Communities that receive their water from other communities are not required to take raw water bacteria samples. Communities that only add chlorine to the water and do not have any other treatment, do not need to take raw water chemical samples because there is no treatment process in place to alter the water quality. The table on page 8 and 9 lists the community water treatment processes.

Water quality data can be viewed on the public water quality database at: http://www.maca.gov.nt.ca/operations/water/WaterQ_Main_MenuSQL.asp

Making Drinking Water Safe

Water Treatment Plant Upgrades

Ensuring safe drinking water in communities requires that water treatment plants are designed to meet local conditions and the water quality standards set out in the Water Supply System Regulations.

MACA and PWS have been working with communities to upgrade water treatment facilities and ensure that drinking water quality meets the GCDWQ since 2004. The turbidity guidelines require that all drinking water supply systems that use a surface water source or a ground water source under the influence of surface water, be filtered or have dual disinfection depending on the raw water quality.

Pressure Filters in the Tuktoyaktuk Water Treatment Plant

Since 2004, water treatment plant upgrade/ replacement projects have been completed in Sachs Harbour, Colville Lake, Nahanni Butte, Behchokǫ̀ (Rae), Aklavik, Tuktoyaktuk, Ulukhaktok, Déljne,

and Behchokǫ̀ (Edzo) in order to meet the turbidity guideline.

With the implementation of the Community Public Infrastructure Funding Policy in April 1, 2007, MACA instituted capital formula funding, whereby community governments became responsible for all aspects of Community Public Infrastructure (CPI).

At the time of implementation, a number of projects remained on MACA's capital plan which included water treatment plant upgrades or replacements in Aklavik, Behchokǫ̀ (Edzo), Dél̨ı̨ne, Tuktoyaktuk, and Ulukhaktok. In order to complete these projects on time and on budget the GNWT explored a design build bundled approach which proved to be more efficient and to eliminate incremental profit margins added at each stage of a separate project.

Design Build

In the past the typical GNWT project implementation approach involved first developing a building design and then contracting a company to construct the building to the design specifications. In a design build you contract one company to complete both these tasks.

Bundling Projects

The GNWT has typically contracted projects individually; however, contracting several projects at once can achieve efficiencies in project implementation and project costs.

Due to the complex nature of water treatment plant upgrades and the economies of scale that were reached during the initial bundled water treatment plant project, the GNWT has committed to project managing another bundled water treatment plant project that will see upgrades in Fort Good Hope, Jean Marie River, Trout Lake, Łutselk'e and Wrigley. Community governments are funding this project in partnership with the federal government. The request for proposal for the design build of these five (5) water treatment plants will be released in May and the contract is anticipated to be awarded in the summer of 2010.

The community of Colville Lake is the northernmost community in the Sahtu region, and is one of the youngest communities in the territories. Until 2009 the community did not have a water treatment plant or distribution system. Prior to the construction of the water treatment plant the practice of gathering water for the residents of Colville Lake was to fill buckets from the lake for household use.

Aklavik Water Treatment Plant
Treatment Train (Left), Operator Training (Right)

Filtration Exclusion

The turbidity guideline allows exclusion from filtration of a surface water source or a groundwater source under the direct influence of surface water in situations where the raw water quality meets specific criteria. In the NWT this exclusion has been requested where source water quality is considered pristine.

Exclusion From Filtration in the NWT

Typically filtration is part of the treatment process, along with chlorination, to ensure drinking water is free of harmful microorganisms. However, filtration systems can be difficult and expensive to operate. Alternatively, with pristine, clean water, standard filtration methods can be avoided with the use of two disinfectants: Ultraviolet (UV) disinfection followed by chlorination. UV is very effective at inactivating protozoa microorganism (Giardia and Cryptosporidium) and is very good against bacteria as well. Chlorine is very effective against viruses and bacteria and has the added advantage of leaving a residual amount in the water to prevent recontamination in the distribution system. This can be as effective and safe as filtration with chlorination. This dual disinfectant method has been approved in the NWT when high quality source water is available for use. The new water treatment plant design in Ulukhaktok received approval to use a dual disinfection strategy for treatment.

The treatment process approved and implemented in Ulukhaktok includes a reusable/washable filter to remove coarse particles followed by UV, chlorination and treated water storage.

Ulukhaktok Water Treatment Plant
Chlorine Injection System (Left), UV Disinfection System (Middle), Exterior View of Water Plant (Right)

There are other communities that require upgrades that would likely qualify for exclusion from filtration based on the high quality of their source water.

Waterborne Illness

A disease, caused by a bacterium or organism able to live in water, which can be transmitted by water.

Pathogenic Organisms

Organisms, including bacteria, viruses, or cysts, capable of causing diseases (typhoid, cholera, dysentery) in a host (such as a person). There are many types of organisms which do NOT cause disease. These organisms are called nonpathogenic.

Pilot Studies

PWS, in consultation with MACA and HSS carried out two pilot projects in Jean Marie River and Trout Lake. The objective of the study was to examine the ability of using an alternative water treatment technology for the removal of colour and natural organic matter from community water supply source.

Jean Marie River Pilot Study (Left to Right): Pilot System Setup, Raw Water, Pilot System in Use, Treated Water.

The pilot study treatment process used an anionic resin to remove natural organic matter and colour in the raw water. No chemical adjustment or optimization is required with the exception of salt for resin regeneration. This process is new to the NWT and even to southern Canada for municipal water systems. The processes were demonstrated to the community staff, senior administative officer, council members and local residents and was well received. Treated water was also given to the community for a tea test. Preliminary findings indicated that all parameters tested meet the GCDWQ, especially for colour.

Community	Water Source	Water Licence	Certified Operator	Certified Backup Operator	Treated Water Bacteria Tests (52 required :216 for Yellowknife)	
					2008	2009
Aklavik	Mackenzie River (Peel Channel)	✓	✓	×	46	54
Colville Lake	Colville Lake	✓	×	×	BWA	BWA
Déljne	Great Bear Lake	✓	×	×	39	31
Dettah	Yellowknife River	✓	N/A		0	0
Behchokǫ̀ (Edzo)	Frank Channel	✓	✓	×	59	96
Behchokǫ̀ (Rae)	Marian Lake	✓	✓	×	51	81
Enterprise	Town of Hay River	×	N/A		N/A	
Fort Good Hope	Mackenzie River	Underway	✓	×	38	40
Fort Liard	Groundwater Well	✓	×	×	132	97
Fort Mcpherson	Deep Water Lake	✓	✓	✓	43	45
Fort Providence	Mackenzie River	✓	✓	×	73	35
Fort Resolution	Great Slave Lake	Underway	✓	×	32	31
Fort Simpson	Mackenzie River	✓	✓	✓	38	56
Fort Smith	Slave River	✓	✓	✓	52	56
Gamètì	Rae Lake	✓	×	×	57	200
Hay River	Hay River	Underway	×	×	65	51
Hay River Reserve	Town of Hay River	N/A	N/A		N/A	
Inuvik	Mackenzie River and 3 mile Lake/Hidden Lake	✓	✓	✓	70	54
Jean Marie River	Jean Marie River	×	✓	✓	24	22
Kakisa	Town of Hay River	N/A	N/A		N/A	
Łutselk'e	Great Slave Lake	×	×	×	43	31
Nahannie Butte	Groundwater Well	×	×	×	42	18
Norman Wells	Mackenzie River	✓	✓	×	55	63
Paulatuk	New Water Lake	✓	×	×	72	46
Sachs Harbour	DOT Lake	✓	×	×	29	23
Trout Lake	Trout Lake	×	✓	×	35	5
Tsiigehtchic	Tso Lake	✓	✓	×	28	41
Tuktoyaktuk	Kudlak Lake	✓	✓	✓	65	43
Tulita	Great Bear River	✓	✓	×	29	31
Ulukhaktok	RCAF Lake	✓	✓	×	39	41
Wekweètì	Snare Lake	✓	✓	×	12	32
Whatì	Groundwater Well	✓	×	×	121	132
Wrigley	Groundwater Well	×	×	×	23	11
Yellowknife	Yellowknife River	✓	✓	✓	423	393

Treated Water Chemical Tests (1 required)		Plant Classification	Water Treatment Process
2008	2009		
1	1	Class II	Conventional (Coagulation, Flocculation, Sedimentation and Filtration), Chlorination and Storage
2	1	Small System	Cartridge Filtration, Chlorination, Storage
0	2	Small System	Cartridge Filtration, UV, Chlorination, Storage
N/A		N/A	Chlorination
1	1	Class II	Conventional (Coagulation, Flocculation, Sedimentation and Filtration), Chlorination and Storage
0	1	Class II	Conventional (Coagulation, Flocculation, Sedimentation and Filtration), Chlorination and Storage
N/A		N/A	see Town of Hay River
0	1	Small System	Chlorination
2	0	Class I	Potassium Permangnate Assisted Greensand Filtration, Softening, Chlorination, Storage
1	1	Class II	Conventional (Coagulation, Flocculation, Sedimentation and Filtration), Chlorination and Storage
3	0	Class II	Conventional (Coagulation, Flocculation, Sedimentation and Filtration), Chlorination and Storage
2	1	Class II	Conventional (Coagulation, Flocculation, Sedimentation and Filtration), Chlorination and Storage
2	0	Class II	Conventional (Coagulation, Flocculation, Sedimentation and Filtration), Chlorination and Storage
1	1	Class III	Primary Clarifiers, Conventional (Coagulation, Flocculation, Filtration), Chlorination, Storage)
1	1	Small System	Chlorination
1	1	Class II	Conventional (Coagulation, Flocculation, Sedimentation and Filtration), Chlorination and Storage
1	1	Small System	See Town of Hay River + Rechlorination
1	1	Class II	Sand Filtration, Chlorination, Flouride, Storage
1	1	Small System	Chlorination
N/A		N/A	see Town of Hay River
1	1	Small System	Chlorination
2	1	Class I	Potassium Permangnate Assisted Greensand Filtration, Softening, Chlorination, Storage
1	1	Class II	Conventional (Coagulation, Flocculation, Sedimentation and Filtration), Chlorination and Storage
1	1	Small System	Chlorination
1	1	Small System	Cartridge Filtration, Chlorination
1	1	Small System	Chlorination
1	1	Class I	Nano-Filtration, Chlorination, Storage
1	1	Class I	Pressure Filtration, UV, Chlorination, Storage
1	0	Class I	Micro-Filtration, Chlorination, Storage
1	1	Small System	Filtration, UV chlorination, Storage
1	1	Small System	Chlorination
1	1	Class I	Potassium Permangnate Assisted Greensand Filtration, Softening, Chlorination, Storage
1	1	Small System	Chlorination
2	1	Class I	Chlorination, Flouridation, Storage

Water Plant Operator Certification

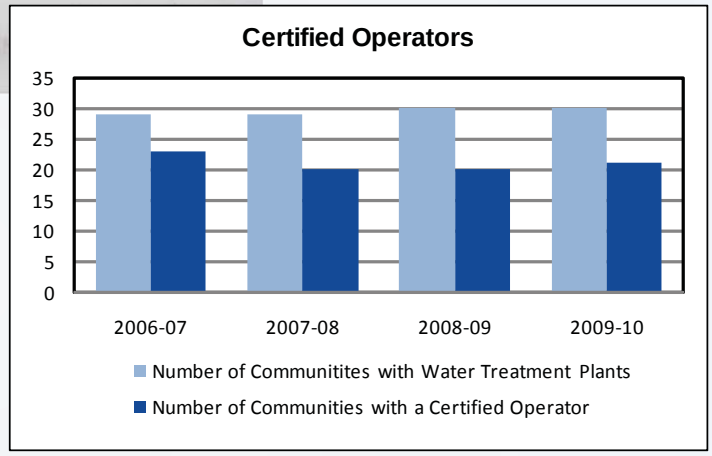
The GNWT approved *Water and Wastewater Operator Certification Guidelines* in 2006. The guideline set standards for classifying water treatment plants and certifying water treatment plant operators.

In the NWT there are four (4) different water treatment plant classifications: Small Systems, Class I, Class II, and Class III. Classifications are based on a number of criteria, some of which include: type of treatment, source water quality, and the chemicals used in the treatment process. Individual plant classifications are provided in the table on page 8 and 9.

Until April 1, 2010 operator certification was voluntary; however, with the changes to the Water Supply System Regulations, operator certification is now mandatory. The GNWT Water and Wastewater Certification Committee approved an option for restricted certification of operators. Restricted certification may be issued on a case by case basis by the Certification Committee to an operator who was able to meet some, but not all of the certification components. A restricted certificate will be non transferrable, limiting the operators certification to their own facility. These changes will be reflected in an updated guideline.

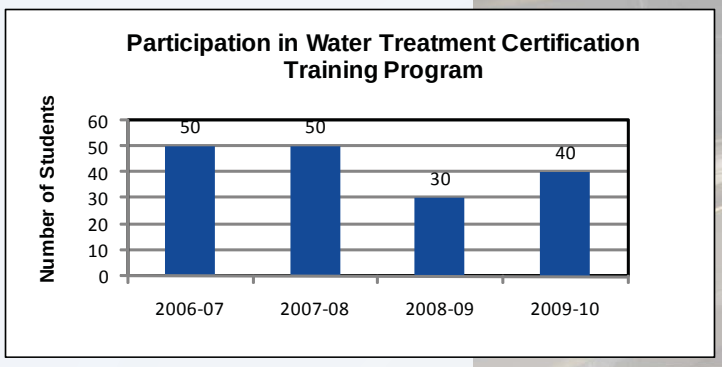
Participants in a Small Systems Operator Training Course

Water treatment plant operators require certification to the same level as their plant. Acheiving certification involves both a written exam; on which an operator must receive a 70% in order to pass, and work experience. The overall goal of the GNWT is to have operators and back-up operators in every plant that are certified to the right level. The ongoing challenge in the NWT is the high rate of operator turnover and more recently the increase in the classifications of water treatment systems as a result of upgrades to the systems. Continous training and hands-on assistance is necessary and is offered by the GNWT on an ongoing basis.



Since 2002 MACA's School of Community Government has been responsible for delivering the operator certification program. The Water and Wastewater Program has evolved from three (3) courses to eight (8) now offering instruction in the areas of water treatment, water distribution, wastewater treatment and collection, and solid waste management.

Five (5) courses were offered from the Water and Wastewater Program in 2008 and in 2009 with a total of 30 participants in 2008 and 40 participants in 2009. There are seven (7) courses scheduled for 2010 and it is anticipated that registration will increase as a result of the requirements for mandatory certification.



Ensuring Drinking Water Is Safe

The GNWT Circuit Rider Program

The GNWT Circuit Rider program has been ongoing since 2006 and has seen improvements in the community water system operations as well as improved working relationship between community government works sector and territorial government agencies. The Circuit Rider program provides hands on training for water treatment plant operators as well as guidance for community administrations in the development of their drinking water delivery and treatment program. A Circuit Rider typically assesses the water treatment operations, identifies training needs, and works with local operators to create an improvement plan.

Ulukhaktok Water Treatment Plant Operator, Gibson Kudlak, Performing Maintenance Training on the UV System.

Some examples of Circuit Rider successes include:

- Household water tank cleaning video was produced. This idea evolved from a circuit riders work with the community of Wrigley to get a household water tank cleaning program implemented. The circuit rider demonstrated the step by step procedures recommended for cleaning tanks.The video was released in November 2009 and will be beneficial to all homeowners. A commercial reminding

Support Material for Operators

The Operators' Corner website was developed in 2006 to give operators easier access to operations and maintenance information. Some information available on the website includes:

- Water quality sampling instructions
- Logsheets for regular operations and maintenance tasks
- Training and certification information
- Safety and emergency response checklists and information

Information is continuously updated and there will be some new additions to the website in 2010. To visit the Operators' Corner go to: *http://www.maca.gov.nt.ca/operations/water/opCorner.htm*

Over the past two years additional course materials were developed to assist in preparing operators for their certification exams. Pre-small systems course material was developed, which highlights the basics of the small systems certification course. The target audience for this material is operators who are new to the job and those that have had difficulty with the small systems course. It was intended that Circuit Riders would use this as a tool to assist operators in achieving certification.

In addition study guides for all of the water treatment certification courses were developed to assist participants in being prepared for the exam. These study guides will be made available on the Operators' Corner.

home owners of their responsibility has also been developed and will be aired throughout the summer and fall of 2010 to promote the cleaning of tanks. Videos can be requested through MACA regional offices.

- Boil water advisory remediation. In a community where a boil water advisory had been issued the circuit rider was able to travel into the community to assist with the remediation effort and to assist operators to complete the necessary requirements to have the boil water advisory lifted.
- Job shadowing for operators in Fort McPherson and Aklavik. The circuit rider and MACA regional staff are working in cooperation with PWS and the community governments to work out a job shadowing schedule for community employees so they can work towards taking over the operations of their water treatment plant.

During 2008 and 2009 12 different communities received circuit rider assistance. The communities are listed by region below.

North Slave	Beaufort-Delta
Gamètì	Paulatuk
Łutselk'e	Sachs Harbour
Wekweètì	Tsiigehtchic
Whatì	Fort McPherson
Sahtu	**Deh Cho**
Colville Lake	Trout Lake
Délı̨ne	Wrigley

In addition to the circuit rider trips to the above listed communities assistance was provided to Jean Marie River, Fort Good Hope, and Tuktoyaktuk during the seasonal reservoir fill.

Water Treatment Plants (Left to Right): Jean Marie River, Łutselk'e, Wrigley, Trout Lake, and Fort Good Hope

The number of communities receiving circuit rider assistance will be increasing in 2010-11. In addition to the communities listed above circuit riders will visit Ulukhaktok, Aklavik, and Tuktoyaktuk. A goal of three (3) scheduled visits to each community has been set.

Water Treatment Plants (Left to Right): Tulita, Colville Lake, Gamètì, Wekweètì

System Reviews

The GNWT Water supply system and infrastructure reviews have continued. The reports outline the operations as well as the physical infrastructure condition of the water treatment plant and distribution system. The reviews identify changes that are needed and suggest ways to upgrade or better maintain the community's water supply system. Most communities have received two (2) or three (3) reviews. Reviews are completed about once every three (3) years. Reviews are typically not performed if a water treatment plant is receiving an upgrade or if a water treatment plant has been recently commissioned.

Regional EHOs and INAC Resource Management Officers also do regular water treatment plant inspections. EHOs do public health inspections once every six (6) months, and INAC Officers do annual water licence inspections.

Remote Monitoring Strategy in the NWT

There are 30 community water supply systems across the NWT, all of which operate independently. Some of the difficulties and challenges inherent in operating and maintaining water supply systems especially with smaller communities include:

- Remote locations
- Limited resources (such as qualified operators)
- Retaining certified operators

As part of the safe drinking water initiatives, GNWT initiated a pilot project in 2007 to install on-line water quality analyzers and remote telemetry units to allow EHOs to monitor water quality remotely. Fort Providence and Fort McPherson were the first two communities to be tested. The primary driver for continuous on-line monitoring is regulatory. On-line turbidity monitoring is required under the updated GCDWQ; on-line chlorine residual monitoring may be required in the future.

On-line Water Quality Analyzers for Remote Monitoring
Chlorine (Left), Turbidity (Right)

Remote monitoring systems have potential to strengthen the multi-barrier approach; reduce human health risks; facilitate more cost effective technical support to community operators; and potentially can be used to oversee operations in remote communities without any certified operators on an interim basis.

The following table shows which communities in the NWT have been retrofitted or will be considered to have on-line analyzers and remote monitoring installed this FY as well as in the next two years:

Fiscal Year	On-line Turbidimeter	On-line Chlorine Analyser	Remote Monitoring Unit
2009	Ft Providence, Fort Resolution, Fort McPherson, Whatì	Ft Providence, Fort Resolution, Fort McPherson, Whatì	Ft Providence, Fort Resolution, Fort McPherson, Whatì
2010	Colville Lake, Sachs Harbor, Tulita	Colville Lake, Tulita	Colville Lake, Sachs Harbor, Tulita
2011	Gamètì, Wekweètì, Paulatuk		Gamètì, Wekweètì, Paulatuk

Boil Water Advisory

An advisory to the public that all water used for drinking should be boiled for 1 minute. This includes all water used for making infant formula, juices, washing and rinsing vegetables, brushing your teeth and washing your hands.

Boil Water Advisories

Boil Water Advisories are issued by EHOs. A boil water advisory may be issued as a result of:

1. Evidence of conditions such as:
   - unacceptable levels of disease-causing bacteria, viruses or parasites in the water system anywhere from the source to the tap,
   - unacceptable levels in the cloudiness (turbidity) in the water at its originating source
2. Precautionary measure(s) when there is concern that contamination may occur, for example local emergency repairs in the distribution system.

Boil Water Advisories issued in the NWT since 2007 are summarized below. The table shows that boil water advisories were typically issued because of positive bacteriological test results or high turbidity levels.

2007	Colville Lake	WTP Not Complete
	Hay River	Spring Breakup - High Turbidity
	Wekweètì	Chlorine Pump Broken
	Paulatuk	Positive Bacteriological Sample
2008	Colville Lake	WTP Not Complete
	Sachs Harbour	Positive Bacteriological Sample
	Hay River	Spring Breakup - High Turbidity
2009	Colville Lake	Operator Training
	Hay River	Spring Breakup - High Turbidity
	Sachs Harbour	Positive Bacteriological Sample
	Tulita	Spring Breakup - High Turbidity

The Colville Lake boil water advisory is anticipated to be lifted following operator training that is scheduled to take place in May 2010.

A boil water advisory will be lifted once the EHO is satisfied that there is no longer a risk to public safety. This will always involve providing bacteriological water quality results that are considered safe.

The water quality database provides a current list of all boil water advisories in place in NWT communities.

Testing Treated Water Quality

HSS testing requirements for treated water include turbidity and chlorine testing at least three times per day, bacteria testing at least once per week, trihalomethane (THM) testing four times per year, and annual chemical testing.

EHOs continue to work with communities to set up regular bacteria sampling programs and to improve reporting. Over the past couple of years there has been a slow shift to provide onsite bacteriological testing units to community governments. This allows communities to perform their own bacteriological tests on site. With the number of communities receiving onsite bacteriological test kits it will be extremely important to develop standard procedures for transmitting the records from communities to their respective EHO.

Handheld Water Quality Testing Equipment (Left to Right)
Turbidimeter (measures Turbidity),
Colorimeter (measures Chlorine, Iron, and Manganese)

The table on pages 8 and 9 show the number of treated water bacteria and chemical samples each community collected in 2008 and 2009.

Kakisa and Enterprise get treated water trucked in from Hay River and do not need to take treated water quality samples. Treated water quality testing is not applicable (N/A) in these communities. Dettah and Hay River Reserve get water from other communities but add chlorine to it. They do not need to take treated water chemical samples but do need to take treated water bacteria and THM samples.

On-line Water Quality Testing Equipment (Left to Right)
Turbidimeter - Service Scatter (measures high level turbidity)
Ultraviolet Transmittance Meter

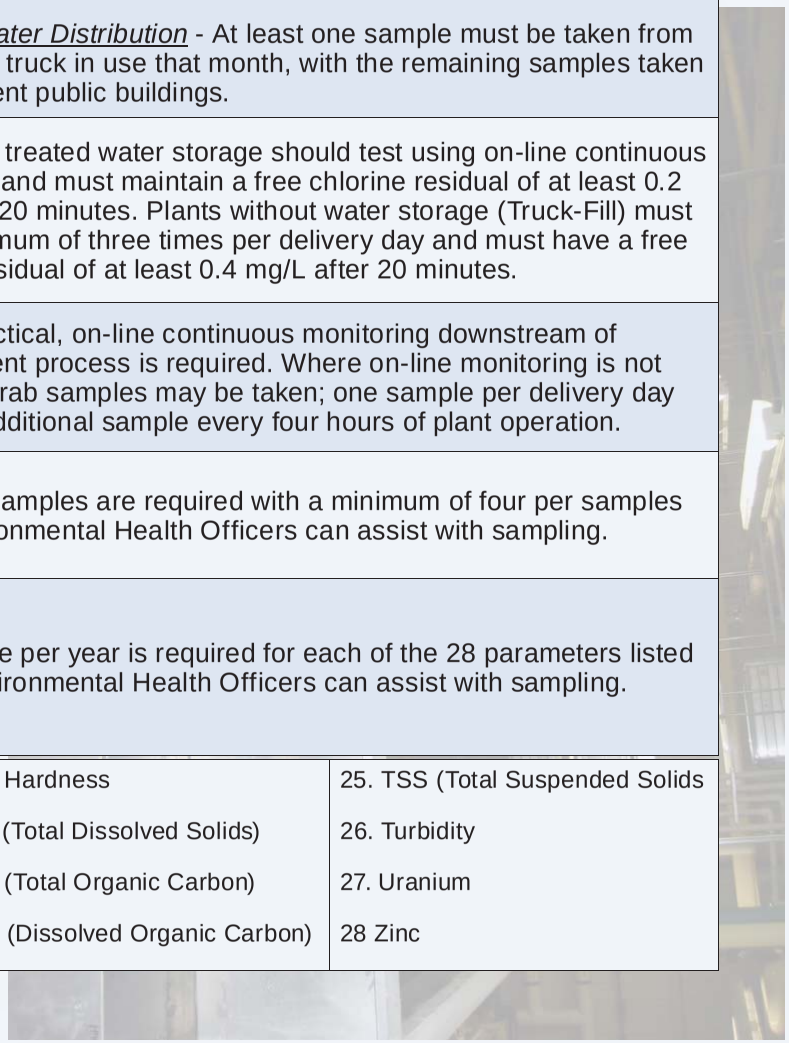
Trihalomethanes (THMs)

THMs are a group of disinfection by-products that can form when the chlorine used to disinfect drinking water reacts with organic matter (e.g., decaying leaves and vegetation) in the water. The vast majority of drinking water treatment plants in Canada use some form of chlorine to disinfect drinking water because of its cost effectiveness in eliminating waterborne diseases and because it can leave a residual amount of available chlorine in the distribution system which prevents growth in the system. The health risks from disinfection by-products, including THMs, are much less than the risks from consuming water that has not been disinfected. As a precaution, disinfection by-products should be kept as low as reasonably achievable without compromising the effectiveness of disinfection. This is achieved by removing THM precursors prior to disinfection and by optimizing treatment processes. (continued on back page)

Summary Table - Drinking Water Sampling and Testing

Parameter	Raw Water	Treated Water
Bacteriological E. coli and total coliforms (presence / absence test)	One sample per month, upstream of the water treatment process.	Minimum four samples per month and one additional sample per month for every 1,000 in population over 4,000. Samples should be taken every week. *Piped Water Distribution* - At least one sample taken immediately after treatment with the remaining samples taken from different locations in the distribution system. *Trucked Water Distribution* - At least one sample must be taken from each water truck in use that month, with the remaining samples taken from different public buildings.
Chlorine	Not applicable.	Plants with treated water storage should test using on-line continuous monitoring and must maintain a free chlorine residual of at least 0.2 mg/L after 20 minutes. Plants without water storage (Truck-Fill) must test a minimum of three times per delivery day and must have a free chlorine residual of at least 0.4 mg/L after 20 minutes.
Turbidity	One sample per day, upstream of the water treatment process.	Where practical, on-line continuous monitoring downstream of the treatment process is required. Where on-line monitoring is not practical, grab samples may be taken; one sample per delivery day plus one additional sample every four hours of plant operation.
Trihalomethanes (THMs)	Not applicable.	Quarterly samples are required with a minimum of four per samples year. Environmental Health Officers can assist with sampling.
Chemical and Physical Parameters	If disinfection, i.e. chlorination/ UV light, is the only water treatment process, then raw water samples are not required. Otherwise, one sample per year of the 28 parameters listed below is required.	One sample per year is required for each of the 28 parameters listed below. Environmental Health Officers can assist with sampling.

1. Alkalinity	5. Cadmium	9. Copper	13. Nitrate	17. pH	21. Total Hardness	25. TSS (Total Suspended Solids
2. Aluminum	6. Chloride	10. Cyanide	14. Lead	18. Selenium	22. TDS (Total Dissolved Solids)	26. Turbidity
3. Arsenic	7. Chromium	11. Flouride	15. Manganese	19. Sodium	23. TOC (Total Organic Carbon)	27. Uranium
4. Barium	8. Colour	12. Iron	16. Mercury	20. Sulphate	24. DOC (Dissolved Organic Carbon)	28 Zinc



In the NWT, due to the good quality of our raw water and treatment processes, disinfection by-products such as THMs have not been an issue in most communities and only seasonal problems in a few communities such as Yellowknife and Inuvik. However, both communities have plans to upgrade their water treatment plants and will meet the GCDWQ for THMs in the near future.

THM sampling for 2008 and 2009 in communities was not done quarterly. In most communities there was only one test result for THMs. Improving THM testing is identified as an action item for this year. EHOs and circuit riders will work with community governments to ensure improvement in 2010.

Water Quality Database

Community drinking water quality test results are available on the public water quality database located at the following website: http://www.maca.gov.nt.ca/operations/water/WaterQ_Main_MenuSQL.asp. HSS continues to keep the website up to date.

Outlook for 2010

In 2010, the GNWT will continue working with communities to:

- Complete on-going WTP upgrades and plan for future projects;
- Promote public awareness and education on community drinking water and the important role we all play;
- Strengthen support to WTP Operators; and
- Improve water quality reporting.

These steps will help ensure the continued safety of NWT drinking water in years to come.

Questions or Concerns

If you have any questions or concerns regarding community water quality please contact your Regional Environmental Health Officer:

Community	Contact
Fort Simpson Wrigley Fort Liard Nahanni Butte BHP Tungsten	**Doug Carr** Environmental Health Officer Tel.: (867) 873-2940 Email: doug_carr@gov.nt.ca
Behchokǫ̀ Jean Marie River Trout Lake Diavik	**Tanja Rarog** Environmental Health Officer Cell: (867) 445-8762 Tel.: (867) 669-6722 Email: tanja_rarog@gov.nt.ca
Łutselk'e Wekweètì Whatì Gamètì De Beers	**Steven Shen** Environmental Health Officer Tel.: (867) 766-7924 Cell: (867) 445-9829 Email: steven_shen@gov.nt.ca
Colville Lake Délı̨ne Fort Good Hope Norman Wells Tulita Aklavik Fort McPherson Inuvik Paulatuk Sachs Harbour Tsiigehtchic Tuktoyaktuk Ulukhaktok	**Robert Savoury** Environmental Health Officer Tel.: (867) 777-7250 Cell: (867) 678-5616 Email: robert_savoury@gov.nt.ca
Duane Fleming Chief Environmental Health Officer Tel.: (867) 873-2183 Cell: (867) 445-8761 Email: duane_fleming@gov.nt.ca	

Behchokǫ̀ (Edzo) Water Treatment Plant